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(54) **Prosthetic tibial component with modular sleeve**

Prothetisches Tibiateil mit modularer Hülse

Elément tibial à manchon modulaire

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EP 1 396 240 B1

Description

[0001] The present invention relates to modular components of a prosthetic joint, and more particularly to modular components of a prosthetic knee joint.

[0002] The knee joint basically consists of the bone interface of the distal end of the femur and the proximal end of the tibia. Appearing to cover or at least partially protect this interface is the patella which is a sesamoid bone within the tendon of the long muscle (quadriceps) on the front of the thigh. This tendon inserts into the tibial tuberosity and the posterior surface of the patella is smooth and glides over the femur.

[0003] The femur is configured with two knob-like processes (the medial condyle and the lateral condyle) which are substantially smooth and articulate with the medial plateau and the lateral plateau of the tibia, respectively. The plateaus of the tibia are substantially smooth and slightly cupped thereby providing a slight receptacle for receipt of the femoral condyles.

[0004] When the knee joint is injured whether as a result of an accident or illness, a prosthetic replacement of the damaged joint may be necessary to relieve pain and to restore normal use to the joint. Typically the entire knee joint is replaced by means of a surgical procedure which involves removal of the ends of the corresponding damaged bones and replacement of these ends with prosthetic implants. This replacement of a native joint with a prosthetic joint is referred to as a primary total-knee arthroplasty.

[0005] On occasion, the primary knee prosthesis fails. Failure can result from many causes, including wear, aseptic loosening, osteolysis, ligamentous instability, arthrofirosis and patellofemoral complications. When the failure is debilitating, revision knee surgery may be necessary. In a revision, the primary knee prosthesis is removed and replaced with components of a revision prosthetic knee system.

[0006] In revision knee surgery or arthroplasty, bone loss on the proximal tibia can make it difficult to properly stabilize the tibial component of the revision system with respect to the intramedullary canal of the tibia. Various implant configurations are available for immobilisation and stabilization of the tibial component, and for distributing the load at the proximal end of the tibia.

[0007] For example, it is known to provide integral keels that extend from the stem of the tibial component to the distal surface of the tibial tray. Such a prosthetic implant is illustrated in FIG. 1. As there shown, the tibial component 10 includes a tibial tray 12 and a tibial stem 14 extending outward from and integral with the distal side 16 of the tibial tray 12. In this prior art component, three integral keels 18, 20, 22 extend between the stem 14 and the distal surface 16 of the tray 12. The stem is hollow and can accept a stem extension (not shown) at its distal end 24. The keels 18, 20, 22 serve to help stabilize the implant 10 in the proximal tibia.

[0008] It is also known to provide a stepped or terraced sleeve for the tibial stem. Such sleeves are sold commercially as "S-ROM" products by DePuy Orthopaedics, Inc. of Warsaw, Indiana. An example of such a system is illustrated in FIGS. 2-5 of the drawings. The tibial component 30 of this prior art system also has a tibial tray 32 and an integral stem 34 that can be connected to stem extensions (not shown) at the distal end 38. However, in this prior art system, there are no keels on the distal side 36 of the tibial tray 32. In this prior art system, a separate, modular sleeve is provided. An example of such a modular sleeve is illustrated in FIGS. 2-4. The modular sleeve is shown at 40 in FIGS. 2-4. The modular sleeve 40 has a tapered interior bore 42 that in which part of the stem 34 of the tibial component 40 of FIG. 5 is received. The tapered interior bore 42 is widest at the proximal end and most narrow at the distal end, corresponding to the shape of the stem 34. As shown in FIGS. 2 and 3, the proximal surface 44 of the modular sleeve 40 has an overall elliptical shape and is generally flat to fit against the distal surface 36 of the tibial tray 32. As shown in FIG. 4, the modular sleeve has a stepped or terraced outer surface 46. The sleeves help stabilize the implant, particularly in case of bone loss, and distribute load.

[0009] EP-A-904749 discloses a joint prosthesis system which comprises a tibial tray component and a tibial bearing insert. The tibial component sits on the resected tibia and has a stem which is hollow and extends into a cavity in the tibia. The bearing insert sits on the tibial tray component and has a stem which can be received in the hollow stem of the tray component.

[0010] The present invention provides a modular prosthetic implant system that provides the surgeon and patient with the advantages of both a keeled tibial component and a modular sleeve design, increasing the surgeon's options during surgery so that the optimal implant design can be selected for the patient's needs.

[0011] In one aspect, the present invention provides a modular prosthetic tibial sleeve comprising a proximal surface having a generally oval outline with spaced reliefs. The sleeve also has a distal end and a terraced outer surface tapering from the proximal surface toward the distal end. The sleeve has an interior channel extending from the proximal surface to the distal end.

[0012] In another aspect, the present invention provides a prosthetic knee system comprising a tibial component and a modular sleeve. The tibial component comprises a tibial tray, a stem and keels. The modular sleeve comprises a proximal surface with spaced reliefs, a distal end, and an interior channel extending from the proximal surface to the distal end. The reliefs are sized, shaped and positioned to allow the modular sleeve to be mounted on the tibial component with the stem of the tibial component received in the interior channel of the sleeve and the keels of the tibial component received in the spaced reliefs of the modular sleeve.

[0013] Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a prior art tibial implant with keels;
FIG. 2 is a bottom plan view of a prior art terraced sleeve;
FIG. 3 is a top plan view of the prior art terraced sleeve of FIG. 2;
FIG. 4 is a front elevation of the prior art terraced sleeve of FIGS. 2-3;
FIG. 5 is a front elevation of a prior art tibial implant for use with the prior art terraced sleeves of FIGS. 2-4;
FIG. 6 is a side elevation of a tibial component of the implant system of the present invention;
FIG. 7 is a perspective view of the tibial component of FIG. 6;
FIG. 8 is a front elevation of the tibial component of FIGS. 6-7;
FIG. 9 is a bottom plan view of the tibial component of FIGS. 6-8;
FIG. 10 is a perspective view of a modular sleeve of the implant system of the present invention;
FIG. 11 is a side elevation of the modular sleeve of FIG. 10;
FIG. 12 is a top plan view of the modular sleeve of FIGS. 10-11;
FIG. 13 is a front elevation of the modular sleeve of FIGS. 10-12;
FIG. 14 is a cross-section of the modular sleeve of FIGS. 10-13, taken along line 14-14 of FIG. 12;
FIG. 15 is a cross-section of the modular sleeve of FIGS. 10-14, taken along line 15-15 of FIG. 13;
FIG. 16 is a top plan view of the modular sleeve of FIGS. 10-15 showing the angular relationships and clearance allowed by the reliefs of the modular sleeve;
FIG. 17 is a front elevation of an assembly of a modular sleeve and tibial component;
FIG. 18 is a bottom plan view of the assembly of the modular sleeve and tibial component, with parts removed for clarity of illustration, showing one possible angular relationship between the tibial component and the sleeve;
FIG. 19 is a bottom plan view of the assembly of the modular sleeve and tibial component, with parts removed for clarity of illustration, showing a second possible angular relationship between the tibial component and the sleeve;
FIG. 20 is a bottom plan view of the assembly of the modular sleeve and tibial component, with parts removed for clarity of illustration, showing a third possible angular relationship between the tibial component and the sleeve;
FIG. 21 is a perspective view of an example of a femoral component that could be used as part of a prosthetic knee system with the modular sleeve and tibial component of FIGS. 6-20; and
FIG. 22 is a perspective view of an example of a tibial bearing component that could be used as part of a prosthetic knee system with the modular sleeve and tibial component of FIGS. 6-20 and the femoral component of FIG. 21.

[0014] Referring to the drawings, FIGS. 6 to 22 show a prosthetic knee implant system 100 which includes a tibial component 102 and a modular sleeve 104. The tibial component 102 and modular sleeve 104 can be provided as components of a prosthetic knee implant system that also includes a femoral component and tibial bearing.

[0015] An example of a femoral component is illustrated at 103 in FIG. 21 and an example of a tibial bearing insert is illustrated at 105 in FIG. 22. It should be understood that these illustrated components 103, 105 are provided as examples of components that can be used with the tibial component 102 and modular sleeve 104 shown in FIGS. 6-20. The present invention is not limited to the particular femoral and tibial bearing insert components 103, 105 illustrated or the illustrated features of these components unless expressly called for in the claims.

[0016] The tibial component 102 of the illustrated system 100 includes a tibial tray 106 and an integral stem 108 extending distally from the distal side 110 of the tibial tray 106. Two keels 112, 114 are integral with and connect the tibial tray 106 and the stem 108. In the illustrated embodiment, the two keels 112, 114 extend outward and toward the posterior side 116 of the tray 106, defining an angle of 130°, as shown at θ in FIG. 9. However, it should be understood that this particular keel configuration is provided by way of example only; the invention is not limited to any particular number or geometric relationship between the keels unless expressly called for in the claims; for example, the tibial component could have three or more keels.

[0017] As shown in FIG. 9, the illustrated tibial component is symmetrical about a central plane 121 that divides the tibial tray 106 into medial and lateral portions.

[0018] The stem 108 is tapered from a widest dimension at the tibial tray 106 to a most narrow dimension at the distal end 109 of the stem 108. The stem has an anterior side 117 and posterior side 119. The central stem 108 has a Morse taper.

[0019] As shown in FIGS. 10-11 and 13, the illustrated modular sleeve 104 has a stepped or terraced outer surface 118, tapering with each step from the proximal end 120 to the distal end 122. This terraced surface 118 serves the same function as the terraced surface of the prior art modular sleeve: it helps to stabilize the implant in the tibia, particularly in the case of bone loss, and to distribute load in the tibia. However, the invention is not limited to the illustrated configuration unless expressly called for in the claims.

[0020] As shown in the top plan view of FIG. 12, the modular sleeve 104 of the illustrated embodiment has an overall elliptical outline, with a major axis 124 and a minor axis 126, and a central longitudinal axis 128. It has proximal surface 129 with a posterior-facing edge 130 and an anterior-facing edge 132. The major axis 124 defines

a posterior portion 131 and an anterior portion 133 of the proximal surface (shown in FIGS. 12 and 16).

[0021] The proximal surface 129 has an overall oval outline in top plan view. As shown in FIGS. 12 and 16, the modular sleeve 104 of the illustrated embodiment includes two reliefs 134, 136 in the proximal surface 129, generally in the posterior portion 131 between the major axis 124 and the posterior-facing edge 132 of the modular sleeve 104. These reliefs 134, 136 are shaped to receive the two keels 112, 114 of the tibial component 110 so that the modular sleeve can be used with the keeled tibial component.

[0022] The two reliefs 134, 136 are shaped to allow some relative rotation between the tibial component 110 and the sleeve 104 when the tibial component 110 and sleeve 104 are assembled. FIG. 16 illustrates the angular relationships of various structures of the sleeve 104. In the illustrated embodiment, the angle α is 56°, β is 25°, θ is 130° to correspond with the angle θ between the keels 112, 114 as shown in FIG. 9, and Φ is 25°. With these angular relationships, the shapes of the keels 112, 114 and reliefs 134, 136 in the illustrated embodiment will allow for about plus or minus 20° relative rotation between these components 104, 110 in assembly. However, it should be understood that these angles are provided as examples only; the present invention is not limited to any particular angular relationship unless expressly set forth in the claims. In addition, the present invention is not limited to any particular degree of relative movement allowed between the components unless expressly called for in the claims. It should be understood that the particular shape and geometric relationship between the reliefs 134, 136 are provided by way of example only; the present invention is not limited to the structure described and illustrated unless expressly called for in the claims.

[0023] The modular sleeve 104 also has an interior channel 140 that extends from the proximal surface 129 to the distal end 122 of the sleeve 104. The interior channel 140 is shaped to receive and frictionally interlock with the stem 108 of the tibial component 110 when the sleeve 104 and tibial component 110 are assembled and impacted together. The interior channel 140 tapers from a largest diameter at the proximal surface 129 to a smallest diameter at the distal end 122. The tapers of the interior channel 140 and stem 108 are Morse tapers. Once the stem 108 and sleeve 104 frictionally interlock, there is no longer any relative rotation or longitudinal movement between the stem 108 and sleeve 104.

[0024] The components of the system of the present invention may be made out of standard materials for such prosthetic implants. For example, the modular sleeve may be made out of a titanium alloy or a cobalt chrome alloy, and the tibial component can be made also be made out of a titanium or cobalt chrome alloy.

[0025] To use the system of the present invention, the surgeon prepares the patient and performs standard surgical techniques to prepare the bone to receive the tibial component 110. For example, the surgeon may progressively ream the intramedullary canal of the tibia to receive the stem 108 and an appropriately sized stem extension (not shown). Trialing may be done in a standard manner. During the procedure, the surgeon determines 110 alone without the sleeve 104. If the proximal tibia has adequate healthy bone tissue, the surgeon can implant the tibial component 110 in a standard manner, and the interaction of the keels 112, 114 and the patient's bone tissue should stabilize the tibial component 110 in the bone. If the surgeon determines that there is a cavity defect or inadequate healthy bone tissue in the proximal tibia, the surgeon can prepare the proximal tibia to receive the assembly of the tibial component and the sleeve using standard reamers and broaches. The surgeon can then insert the stem 108 through the channel 140 of the sleeve 104 and move them together until the keels 112, 114 are received in the reliefs 134, 136 of the sleeve. The modular assembly of the tibial component 110 and sleeve 104 can then be implanted in a standard manner. Impaction of the assembly 110, 104 should interlock the components 110, 104 together. The surgeon can perform other standard techniques to complete the preparation of the femur.

[0026] The modular assembly of the tibial component 110 and the sleeve 104 is illustrated in FIGS. 17-20. The design of the reliefs 134, 136 in the present invention allows for some independent positioning of the sleeve 104 and the tibial component 110, as shown in FIGS. 18-20. The surgeon can place the sleeve 104 in an optimal position for stabilizing the implant while also setting the tibial component 110 in the proper position for interaction with the femoral component 103 of the implant system. For example, as shown in FIG. 18, the sleeve 104 and be placed on the tibial component such that the keels 112, 114 are substantially centred in the reliefs 134, 136; in this configuration, the angle λ between the central plane 121 of the tibial tray and a plane through the major axis 124 of the sleeve 104 can vary: in FIG. 18, the angle λ is 90°. The keels can also be off-centre in the reliefs, as shown in FIGS. 19 and 20: in FIG. 19, the angle λ is 70°; and in FIG. 20 the angle λ is 110°. Thus, the illustrated embodiment of the invention allows the surgeon to rotate the tibial component and sleeve about the interior channel 140 of the sleeve, with a latitude of $\pm$20°. It should be understood that these angles are provided as examples only; the present invention is not limited to these angles or to any particular degree of freedom unless expressly called for in the claims.

[0027] Once the optimal relative rotational position is selected, the surgeon can interlock the tibial component 102 and the sleeve 104 in this optimal position by impacting the components to frictionally engage the stem 108 and the interior surface of the sleeve 104 that defines the interior channel 140. Thus, the tibial component 102 and sleeve 104 can be locked in a variety of relative positions, such as the positions illustrated in FIGS. 18 to 20.

[0028] It will be appreciated by those in the art that

different sizes of tibial components 110 and sleeves 104 can be provided in a single surgical kit for use by the surgeon.

[0029] It will also be appreciated by those in the art that the illustrated tibial component would be used in conjunction with a tibial bearing insert such as that illustrated at 105 in FIG. 22 and with a femoral component such as that illustrated at 103 in FIG. 21.

[0030] Although the invention has been illustrated for use in revision surgery, the principles of the present invention may also find application in primary joint arthroplasties.

Claims

1. A prosthetic knee system comprising:

a tibial component (102) comprising a tibial tray (106) and a stem (108);
a modular sleeve (104) comprising a proximal surface (129) with a distal end (122), an interior channel (140) extending from the proximal surface to the distal end, and an outer surface for contacting the surface of a cavity in the resected tibia;

in which the tibial component has a keel (112, 114), and the modular sleeve (129) has a relief (134, 136) which is sized, shaped and positioned to allow the modular sleeve to be mounted on the tibial component with (a) the stem of the tibial component received in the interior channel of the sleeve, (b) the keel of the tibial component received in the relief of the modular sleeve, and (c) the lower face of the tibial tray around the stem facing towards the resected tibia partially exposed.

2. The prosthetic knee system of claim 1 wherein the proximal surface (129) of the sleeve (104) has a generally oval shape with a major axis (124) defining posterior and anterior portions (131, 133) of the proximal surface, and wherein the relief (134, 136) is in the posterior portion of the proximal surface of the sleeve.

3. The prosthetic knee system of claim 1 wherein the keel (112, 114) and the relief (134, 136) are sized, shaped and positioned to allow relative rotation between the tibial component (102) and the sleeve (104).

4. The prosthetic knee system of claim 3 wherein the keel (112, 114) and the relief (134, 136) are sized, shaped and positioned to allow plus or minus twenty degrees of rotation.

5. The prosthetic knee system of claim 3 wherein the tibial component (102) has a plurality of spaced keels (112, 1140 and the sleeve (104) has a plurality of spaced reliefs (134, 136) in the proximal surface (129) to receive the keels.

6. The prosthetic knee system of claim 3 wherein the stem (108) of the tibial component (102) and the interior channel (140) of the modular sleeve (104) are shaped to allow the tibial component and modular sleeve to be frictionally locked together with the tibial component and modular sleeve in a predetermined position.

7. The prosthetic knee system of claim 6 wherein the tibial component (102) has a central plane (121) defining medial and lateral portions and the proximal surface (129) of the modular sleeve (104) has a major axis (124), and wherein the tibial component and modular sleeve are capable of being frictionally locked together in a position wherein the angle between the central plane of the tibial component and the major axis of the proximal surface of the modular sleeve is less than 90°.

8. The prosthetic knee system of claim 6 wherein the tibial component (102) has a central plane (121) defining medial and lateral portions and the proximal surface (129) of the modular sleeve (104) has a major axis (124), and wherein the tibial component and modular sleeve are capable of being frictionally locked together in a position wherein the angle between the central plane of the tibial component and the major axis of the proximal surface of the modular sleeve is 90°.

9. The prosthetic knee system of claim 8 wherein the tibial component (102) has a central plane (121) defining medial and lateral portions and the proximal surface (129) of the modular sleeve (104) has a major axis (124), and wherein the tibial component and modular sleeve are capable of being frictionally locked together in a position wherein the angle between the central plane of the tibial component and the major axis of the proximal surface of the modular sleeve is less than 90°.

10. The prosthetic knee system of claim 9 wherein the tibial component (102) has a central plane (121) defining medial and lateral portions and the proximal surface (129) of the modular sleeve (104) has a major axis (124), and wherein the tibial component and modular sleeve are capable of being frictionally locked together in a position where the angle between the central plane of the tibial component and the major axis of the proximal surface of the modular sleeve is between 70° and 110°.

11. The prosthetic knee system of claim 1, which addi-

tionally includes at least one of a femoral component (103) and a tibial bearing component (105).

12. A modular prosthetic tibial sleeve having a proximal surface (129) with a distal end (122), an interior channel (140) extending from the proximal surface to the distal end, and a plurality of reliefs (134, 136) which are sized, shaped and positioned to allow the modular sleeve to be mounted on a tibial component with the stem of the tibial component received in the interior channel of the sleeve and the keel of the tibial component received in the relief of the modular sleeve, and having a terraced outer surface (118) tapering from the proximal surface toward the distal end.

13. The modular prosthetic tibial sleeve of claim 12 wherein the proximal surface (129) has a posterior edge (130), an anterior edge (132) and a major axis (124) between the posterior edge and anterior edge defining a posterior portion (131) and an anterior portion (133), and wherein the reliefs (134, 136) are positioned on the posterior portion of the proximal surface.

Patentansprüche

1. Prothetisches Kniesystem, umfassend:

eine Tibiakomponente (102) mit einer Tibiawanne (106) und einem Schaft (108);
eine modulare Hülse (104) mit einer proximalen Fläche (129) mit einem distalen Ende (122), einem inneren Kanal (140), der sich von der proximalen Fläche zum distalen Ende erstreckt, und einer Außenfläche zum Kontaktieren der Fläche eines Hohlraums in der resezierten Tibia;

wobei die Tibiakomponente einen Kiel (112, 114) aufweist und die modulare Hülse (129) eine Aussparung (134, 136) aufweist, die so dimensioniert, geformt und positioniert ist, daß die modulare Hülse auf der Tibiakomponente montierbar ist, wobei (a) der Schaft der Tibiakomponente in dem inneren Kanal der Hülse aufgenommen ist, (b) der Kiel der Tibiakomponente in der Aussparung der modularen Hülse aufgenommen ist und (c) die Unterseite der Tibiawanne um den Schaft zur teilweise exponierten resezierten Tibia zeigt.

2. Prothetisches Kniesystem nach Anspruch 1, **dadurch gekennzeichnet, daß** die proximale Fläche (129) der Hülse (104) eine allgemein ovale Gestalt aufweist, wobei eine Hauptachse (124) posteriore und anteriore Abschnitte (131, 133) der proximalen Fläche definiert, und daß die Aussparung (134, 136) sich in dem posterioren Abschnitt der proximalen Fläche der Hülse befindet.

3. Prothetisches Kniesystem nach Anspruch 1, **dadurch gekennzeichnet, daß** der Kiel (112, 114) und die Aussparung (134, 136) so dimensioniert, geformt und positioniert sind, daß eine relative Drehung zwischen der Tibiakomponente (102) und der Hülse (104) ermöglicht wird.

4. Prothetisches Kniesystem nach Anspruch 3, **dadurch gekennzeichnet, daß** der Kiel (112, 114) und die Aussparung (134, 136) so dimensioniert, geformt und positioniert sind, daß eine Drehung um plus oder minus zwanzig Grad ermöglicht wird.

5. Prothetisches Kniesystem nach Anspruch 3, **dadurch gekennzeichnet, daß** die Tibiakomponente (102) eine Vielzahl von im Abstand angeordneten Kielen (112, 114) aufweist und die Hülse (104) eine Vielzahl von im Abstand angeordneten Aussparungen (134, 136) in der proximalen Fläche (129) zur Aufnahme der Kiele aufweist.

6. Prothetisches Kniesystem nach Anspruch 3, **dadurch gekennzeichnet, daß** der Schaft (108) der Tibiakomponente (102) und der innere Kanal (140) der modularen Hülse (104) so geformt sind, daß die Tibiakomponente und die modulare Hülse mit in einer vorab festgelegten Position befindlicher Tibiakomponente und modularer Hülse miteinander reibschlüssig gekoppelt werden.

7. Prothetisches Kniesystem nach Anspruch 6, **dadurch gekennzeichnet, daß** die Tibiakomponente (102) eine zentrale Ebene (121) aufweist, die mediale und laterale Abschnitte definiert, und die proximale Fläche (129) der modularen Hülse (104) eine Hauptachse (124) aufweist und daß die Tibiakomponente und die modulare Hülse in einer Position, in der der Winkel zwischen der zentralen Ebene der Tibiakomponente und der Hauptachse der proximalen Fläche der modularen Hülse kleiner als 90° ist, miteinander reibschlüssig koppelbar sind.

8. Prothetisches Kniesystem nach Anspruch 6, **dadurch gekennzeichnet, daß** die Tibiakomponente (102) eine zentrale Ebene (121) aufweist, die mediale und laterale Abschnitte definiert, und die proximale Fläche (129) der modularen Hülse (104) eine Hauptachse (124) aufweist, und daß die Tibiakomponente und die modulare Hülse in einer Position, in der der Winkel zwischen der zentralen Ebene der Tibiakomponente und der Hauptachse der proximalen Fläche der modularen Hülse 90° beträgt, miteinander reibschlüssig koppelbar sind.

9. Prothetisches Kniesystem nach Anspruch 8, **da-**

durch gekennzeichnet, daß die Tibiakomponente (102) eine zentrale Ebene (121) aufweist, die mediale und laterale Abschnitte definiert, und die proximale Fläche (129) der modularen Hülse (104) eine Hauptachse (124) aufweist, und daß die Tibiakomponente und die modulare Hülse in einer Position, in der der Winkel zwischen der zentralen Ebene der Tibiakomponente und der Hauptachse der proximalen Fläche der modularen Hülse kleiner als 90° ist, miteinander reibschlüssig koppelbar sind.

10. Prothetisches Kniesystem nach Anspruch 9, **dadurch gekennzeichnet, daß** die Tibiakomponente (102) eine zentrale Ebene (121) aufweist, die mediale und laterale Abschnitte definiert, und die proximale Fläche (129) der modularen Hülse (104) eine Hauptachse (124) aufweist, und daß die Tibiakomponente und die modulare Hülse in einer Position, in der der Winkel zwischen der zentralen Ebene der Tibiakomponente und der Hauptachse der proximalen Fläche der modularen Hülse zwischen 70° und 110° beträgt, miteinander reibschlüssig koppelbar sind.

11. Prothetisches Kniesystem nach Anspruch 1, **dadurch gekennzeichnet, daß** es zusätzlich mindestens eine Femurkomponente (103) oder eine Tibialagerkomponente (105) enthält.

12. Modulare prothetische Tibiahülse mit einer proximalen Fläche (129) mit einem distalen Ende (122), einem inneren Kanal (140), der sich von der proximalen Fläche zum distalen Ende erstreckt und einer Vielzahl von Aussparungen (134, 136), die so dimensioniert, geformt und positioniert sind, daß die modulare Hülse auf der Tibiakomponente montierbar ist, wobei der Schaft der Tibiakomponente in dem inneren Kanal der Hülse aufgenommen ist und der Kiel der Tibiakomponente in der Aussparung der modularen Hülse aufgenommen ist, und mit einer terrassenförmigen Außenfläche (118), die sich von der proximalen Fläche in Richtung auf das distale Ende verjüngt.

13. Modulare prothetische Tibiahülse nach Anspruch 12, **dadurch gekennzeichnet, daß** die proximale Fläche (129) eine posteriore Kante (130), eine anteriore Kante (132) und eine Hauptachse (124) zwischen der posterioren Kante und der anterioren Kante aufweist, die einen posterioren Abschnitt (131) und einen anterioren Abschnitt (133) definiert, und daß die Aussparungen (134, 136) an dem posterioren Abschnitte der proximalen Fläche positioniert sind.

Revendications

1. Système de prothèse de genou comprenant :

- ♦ un élément tibial (102) comprenant un plateau tibial (106) et une tige (108) ;
- ♦ un manchon modulaire (104) comprenant une surface proximale (129) avec une extrémité distale (122), un canal intérieur (140) s'étendant depuis la surface proximale jusqu'à l'extrémité distale, et une surface externe destinée à venir en contact avec la surface d'une cavité du tibia résectionné ;

dans lequel l'élément tibial présente un bourrelet (112, 114) et le manchon modulaire (129) présente un creux (134, 136) qui est dimensionné, formé et positionné pour permettre le montage du manchon modulaire sur l'élément tibial avec (a) la tige de l'élément tibial reçue dans le canal intérieur du manchon, (b) le bourrelet de l'élément tibial reçu dans le creux du manchon modulaire et (c) la face inférieure du plateau tibial, autour de la tige, faisant face au tibia résectionné, partiellement dénudé.

2. Système de prothèse de genou selon la revendication 1 dans lequel la surface proximale (129) du manchon (104) présente une forme globalement ovale avec un axe principal (124) définissant les parties postérieure et antérieure (131, 133) de la surface proximale, et dans lequel le creux (134, 136) se trouve dans la partie postérieure de la surface proximale du manchon.

3. Système de prothèse de genou selon la revendication 1 dans lequel le bourrelet (112, 114) et le creux (134, 136) sont dimensionnés, formés et positionnés pour permettre une rotation relative entre l'élément tibial (102) et le manchon (104).

4. Système de prothèse de genou selon la revendication 3 dans lequel le bourrelet (112, 114) et le creux (134, 136) sont dimensionnés, formés et positionnés afin d'autoriser plus ou moins vingt degrés de rotation.

5. Système de prothèse de genou selon la revendication 3 dans lequel l'élément tibial (102) présente une pluralité de bourrelets espacés (112, 114) et le manchon (104) présente une pluralité de creux espacés (134, 136) dans sa surface proximale (129) pour la réception des bourrelets.

6. Système de prothèse de genou selon la revendication 3 dans lequel la tige (108) de l'élément tibial (102) et le canal intérieur (140) du manchon modulaire (104) sont formés pour permettre à l'élément tibial et au manchon modulaire d'être inter-ver-

rouillés par friction lorsque l'élément tibial et le manchon modulaire sont dans une position prédéterminée.

7. Système de prothèse de genou selon la revendication 6 dans lequel l'élément tibial (102) présente un plan central (121) définissant des parties médiale et latérale, et la surface proximale (129) du manchon modulaire (104) présente un axe principal (124), et dans lequel l'élément tibial et le manchon modulaire peuvent être inter-verrouillés par friction dans une position où l'angle entre le plan central de l'élément tibial et l'axe principal de la surface proximale du manchon modulaire est inférieur à 90°.

8. Système de prothèse de genou selon la revendication 6 dans lequel l'élément tibial (102) présente un plan central (121) définissant des parties médiale et latérale et la surface proximale (129) du manchon modulaire (104) présente un axe principal (124), et dans lequel l'élément tibial et le manchon modulaire peuvent être inter-verrouillés par friction dans une position où l'angle entre le plan central de l'élément tibial et l'axe principal de la surface proximale du manchon modulaire est de 90°.

9. Système de prothèse de genou selon la revendication 8 dans lequel l'élément tibial (102) présente un plan central (121) définissant des parties médiale et latérale et la surface proximale (129) du manchon modulaire (104) présente un axe principal (124), et dans lequel l'élément tibial et le manchon modulaire peuvent être inter-verrouillés par friction dans une position où l'angle entre le plan central de l'élément tibial et l'axe principal de la surface proximale du manchon modulaire est inférieur à 90°.

10. Système de prothèse de genou selon la revendication 9 dans lequel l'élément tibial (102) présente un plan central (121) définissant des parties médiale et latérale et la surface proximale (129) du manchon modulaire (104) présente un axe principal (124) et dans lequel l'élément tibial et le manchon modulaire peuvent être inter-verrouillés par friction dans une position où l'angle entre le plan central de l'élément tibial et l'axe principal de la surface proximale du manchon modulaire est entre 70° et 110°.

11. Système de prothèse de genou selon la revendication 1, comprenant, en outre, au moins un d'un composant fémoral (103) et d'un élément de support tibial (105).

12. Manchon tibial prosthétique modulaire présentant une surface proximale (129) avec une extrémité distale (122), un canal intérieur (140) s'étendant depuis la surface proximale jusqu'à l'extrémité distale et une pluralité de creux (134, 136) dimensionnés, formés et positionnés pour permettre de monter le manchon modulaire sur un élément tibial, la tige de l'élément tibial étant reçue dans le canal intérieur du manchon et le bourrelet de l'élément tibial étant reçu dans le creux du manchon modulaire, et présentant une surface externe en gradins (118) s'évasant depuis la surface proximale jusqu'à l'extrémité distale.

13. Manchon tibial prosthétique modulaire selon la revendication 12 dans lequel la surface proximale (129) présente un bord postérieur (130), un bord antérieur (132) et un axe principal (124) entre le bord postérieur et le bord antérieur définissant une partie postérieure (131) et une partie antérieure (133), et dans lequel les creux (134, 136) sont placés sur la partie postérieure de la surface proximale.

FIG. 1

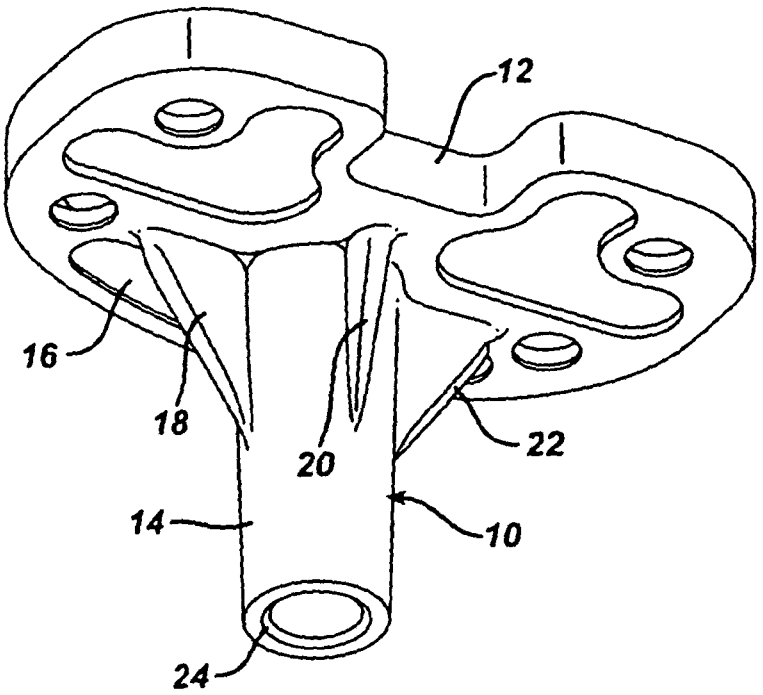

FIG. 2 PRIOR ART

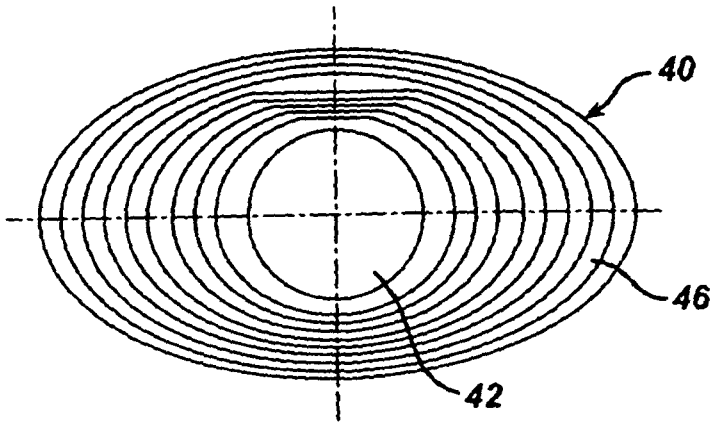

FIG. 3 PRIOR ART

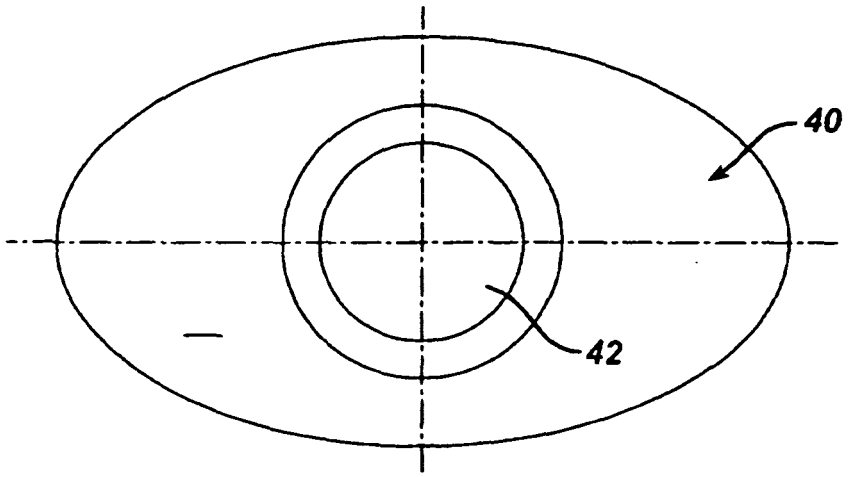

FIG. 4 PRIOR ART

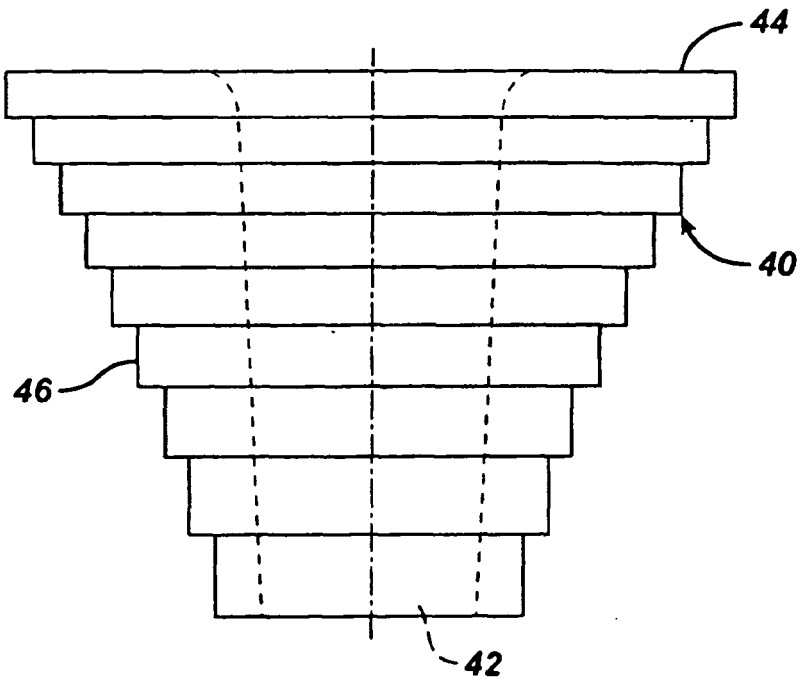

FIG. 5 PRIOR ART

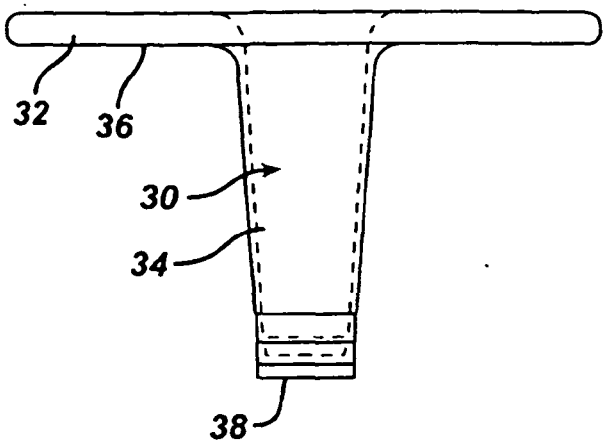

FIG. 6

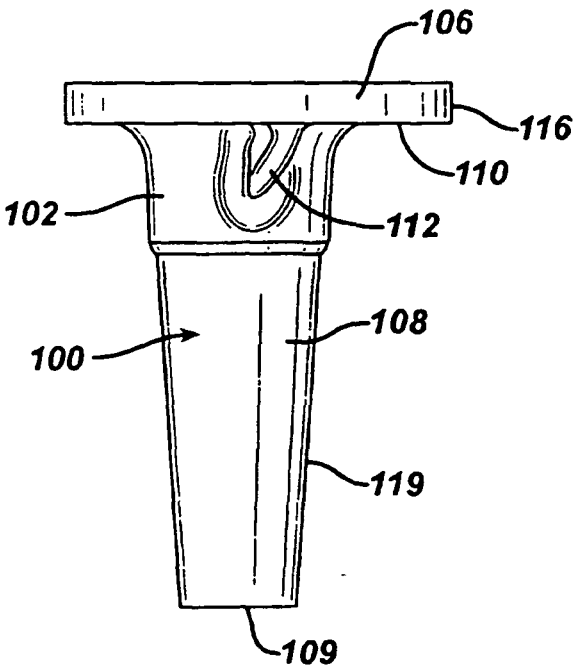

FIG. 7

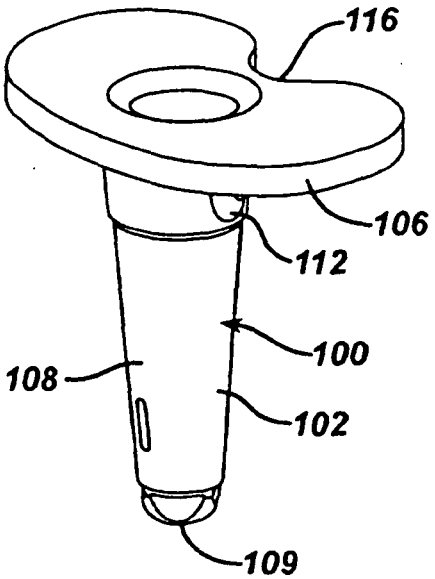

FIG. 8

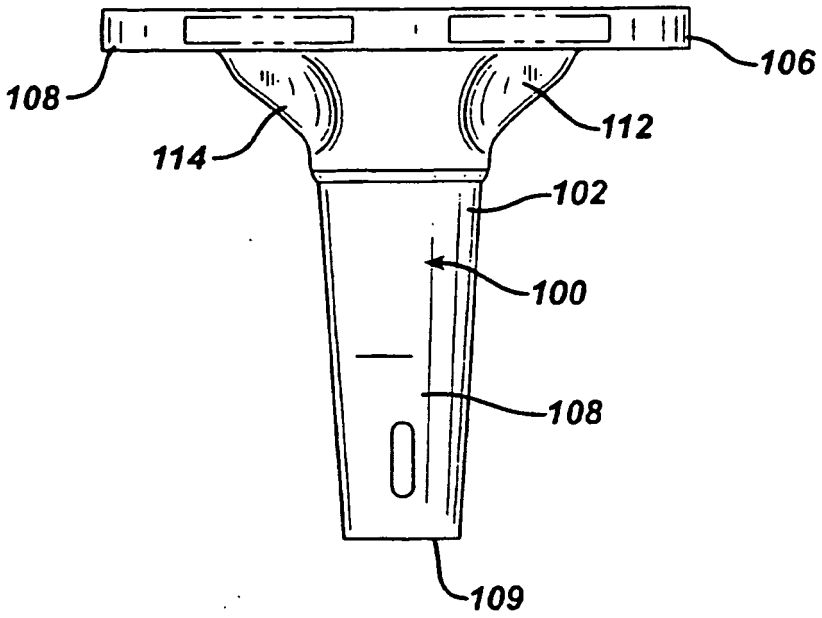
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FIG. 9

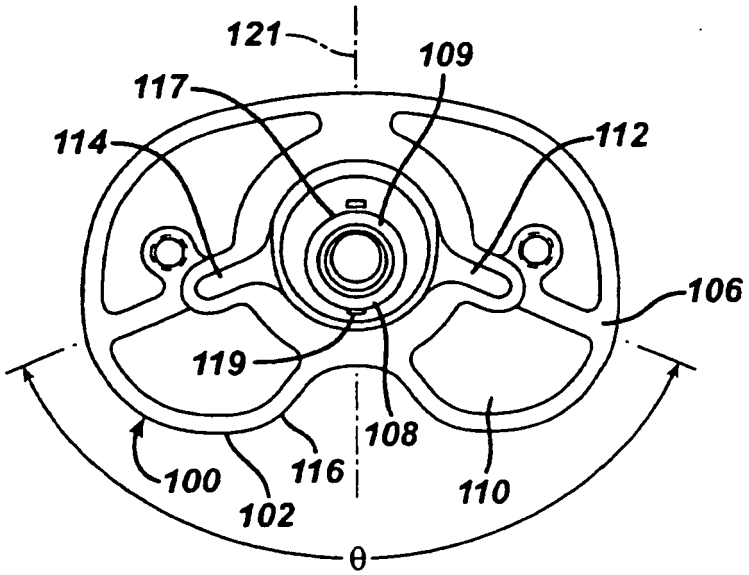
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FIG. 10

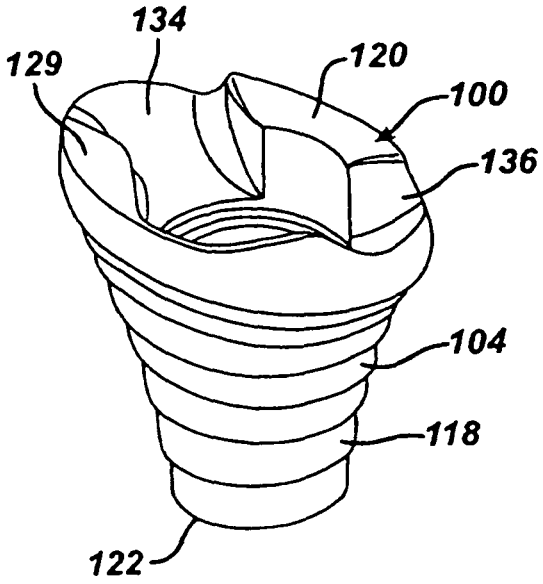

FIG. 11

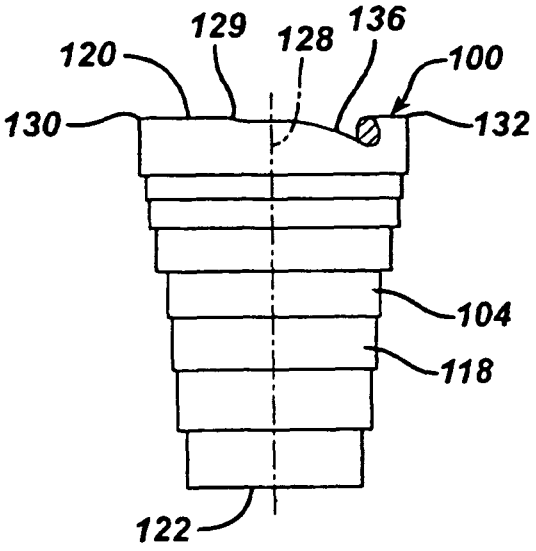

FIG. 12

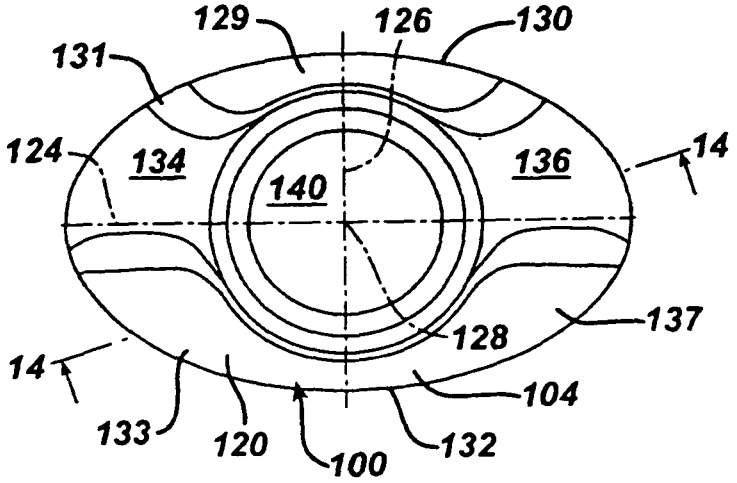

FIG. 13

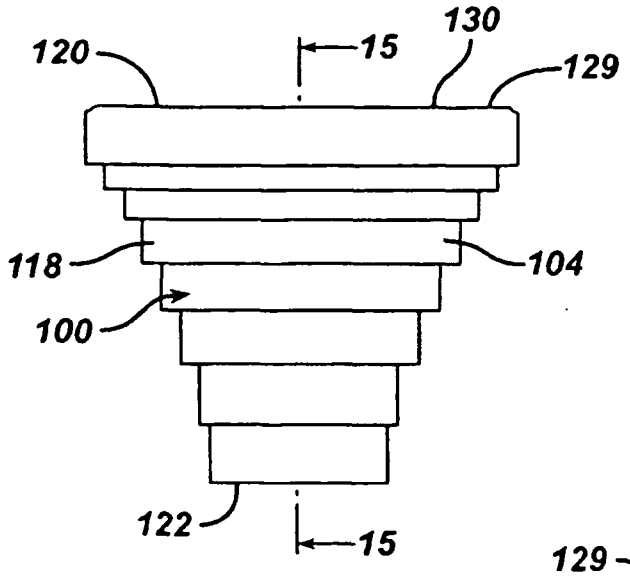

FIG. 14

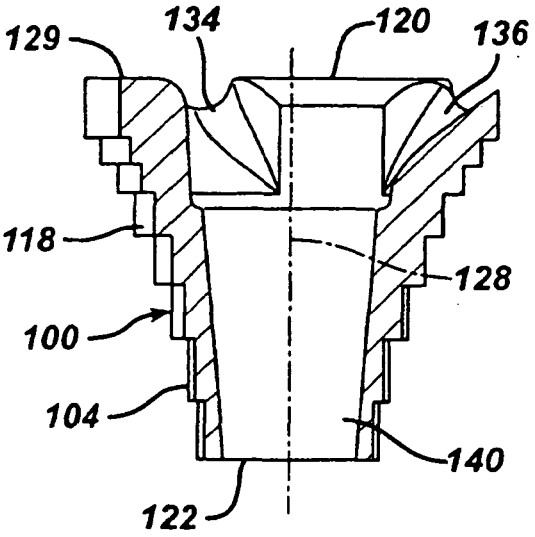

FIG. 15

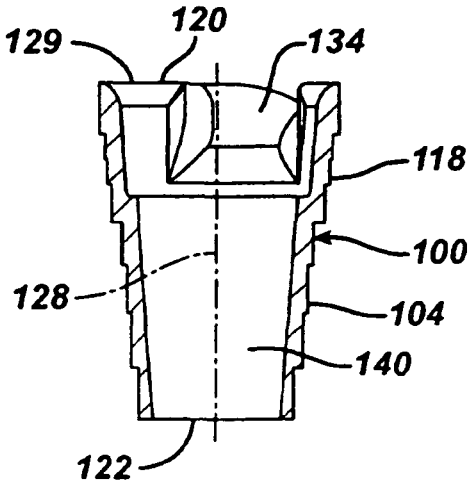

FIG. 16

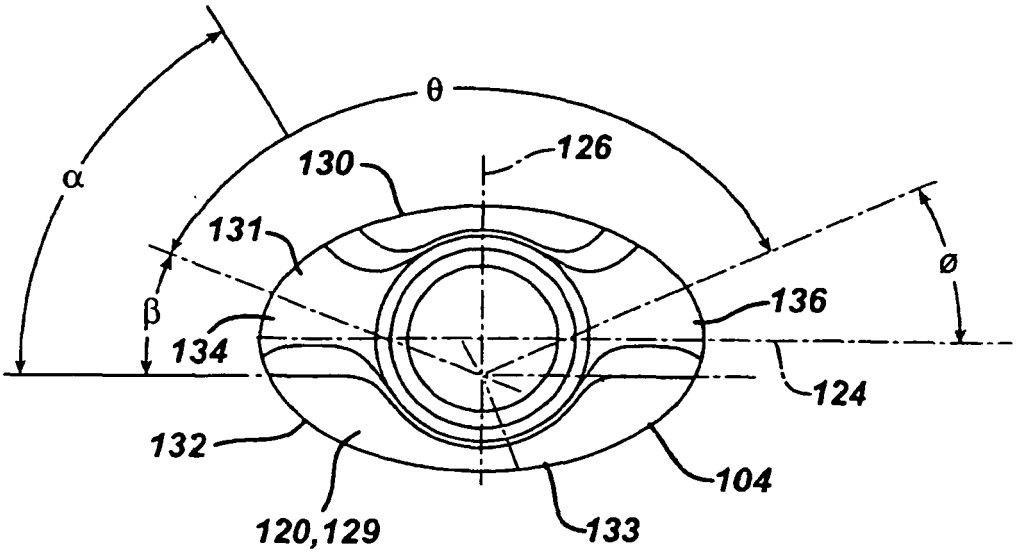
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FIG. 17

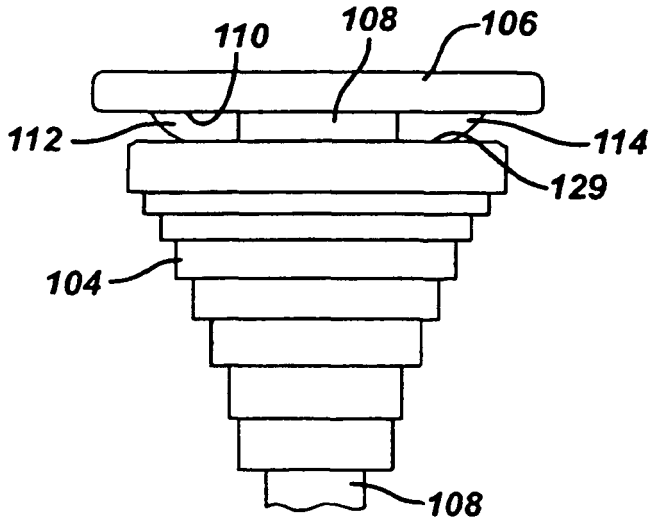
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FIG. 18

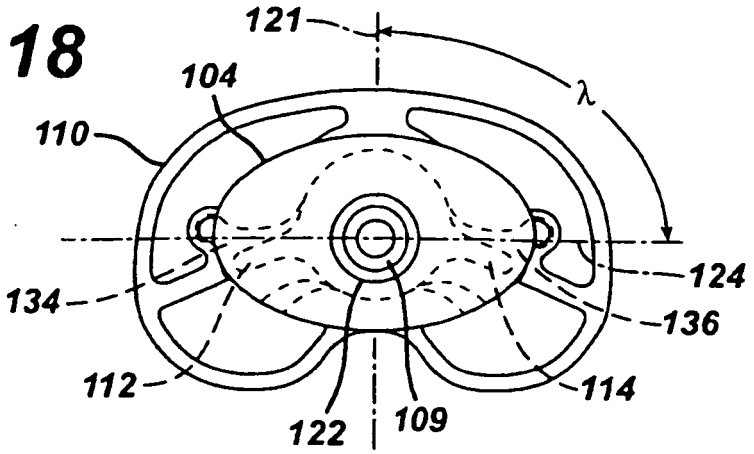


FIG. 19

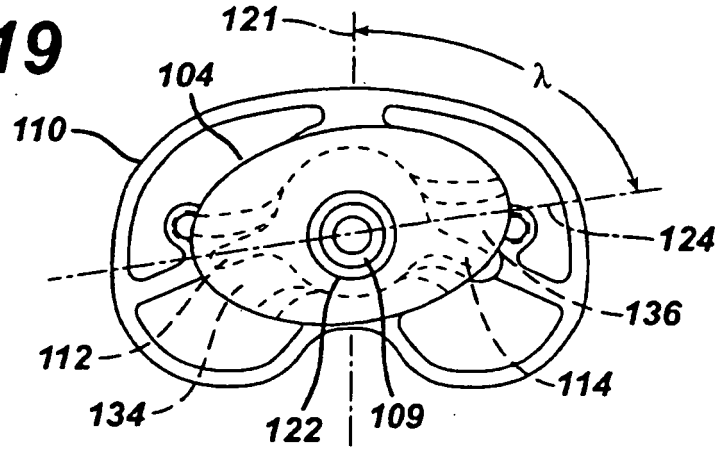


FIG. 20

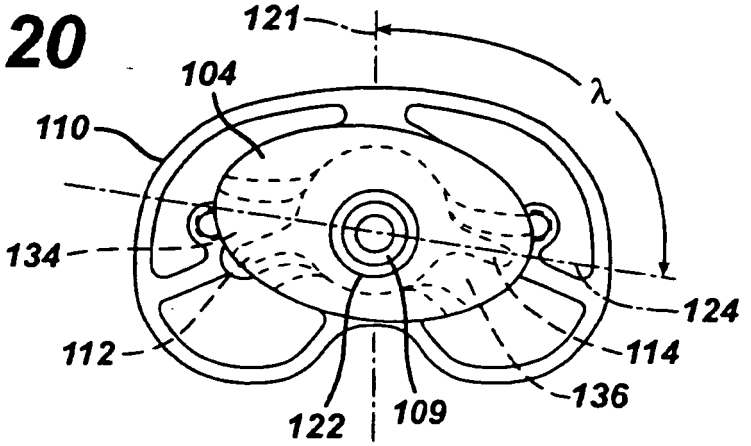


FIG. 21

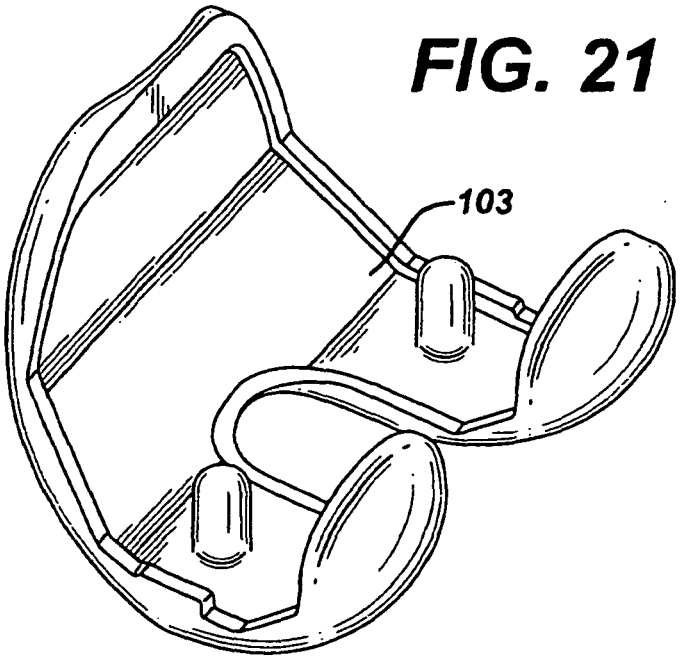
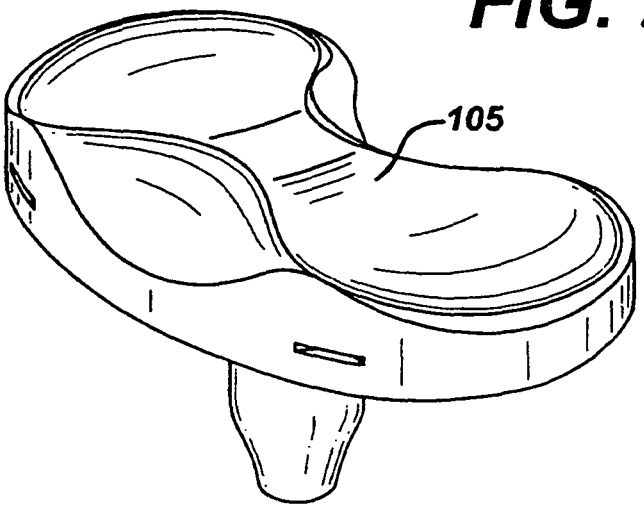


FIG. 22



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Patent documents cited in the description

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